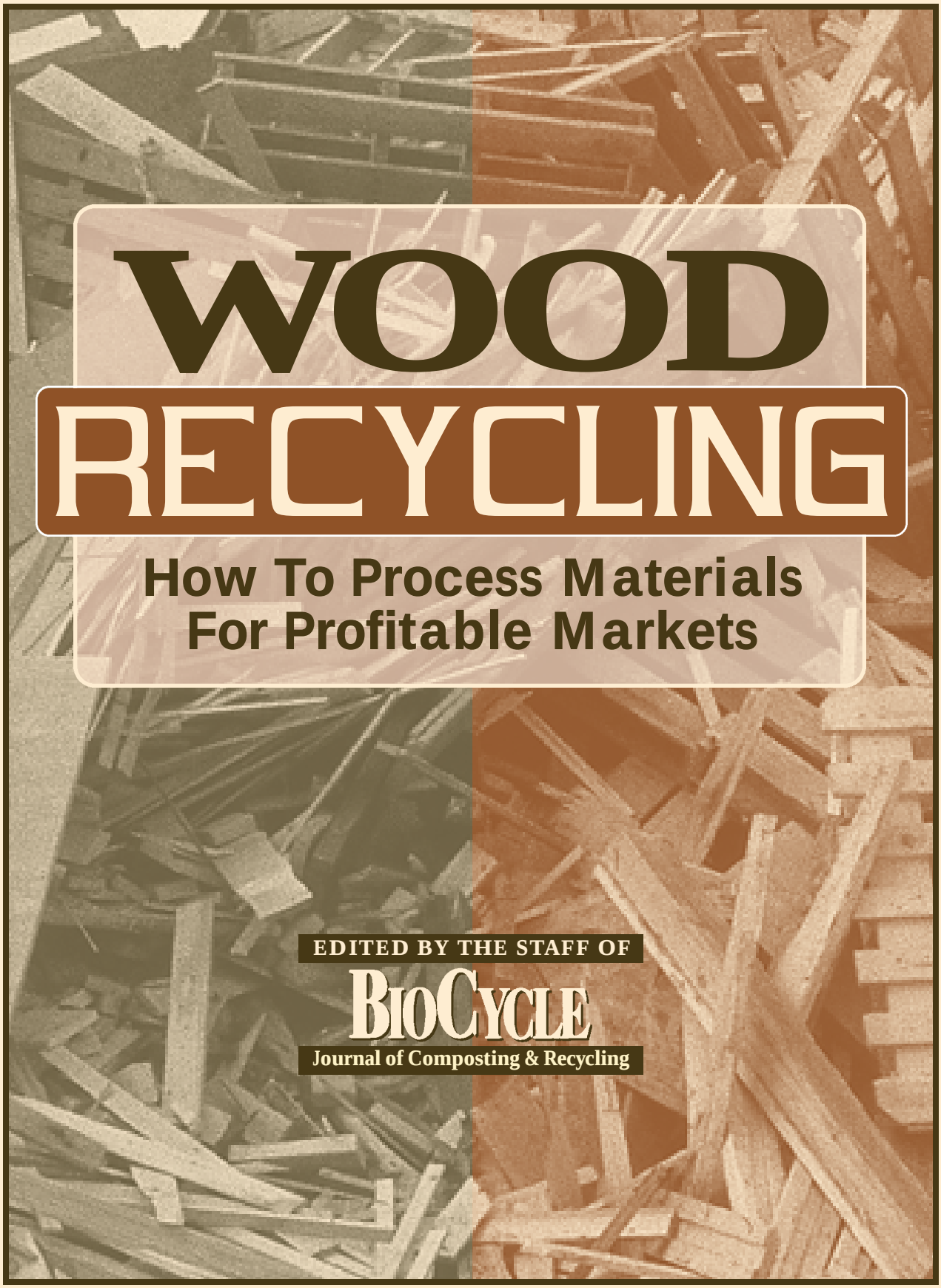

WOOD RECYCLING

How To Process Materials For Profitable Markets

EDITED BY THE STAFF OF

BIOCYCLE

Journal of Composting & Recycling

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Contents

Contents

Recycling Wood Into Marketable Products

ORGANICS recycling has become the fastest growing niche in the waste management industry. For wood residues in particular, the back end has moved front and center when it comes to generating profits. Equipment that can size reduce, screen, sort, transport, monitor, bag, blend and add value are growing in demand.

Even more significant than the equipment and technology now available for converting residuals into marketable products is the rapidly growing recognition of the value of these products. As the editors of *BioCycle* compiled material for this report and talked to woody materials generators, processors and end users, the vast changes taking place in the wood industry became extremely clear. We believe you'll agree as you read the pages of *Wood Recycling: How to Process Materials for Profitable Markets.*

This report begins with an assessment of the growing opportunities in woody materials recovery in the private sector. A number of companies are profiled to illustrate the wide variety of approaches available and how they translate into profitable recovery operations. A Pennsylvania company turns brush, dimensional lumber and tree trimmings into mulch, animal bedding and playground cover. A subsidiary of Waste Management in San Leandro, California handles about 125,000 tons/year of yard trimmings and wood in an "integrated screening and grinding system" that goes into soil blends or to compost facilities.

For land clearers, wood processors, biomass generators, tree care firms and sawmills — plus many others — the challenge has been to make the transition into seeing themselves as product creators. You'll learn the successful strategies they use. In fact, for a great many companies, the challenge has become managing growth as they add more processing sites and more feedstocks to create more product volumes.

Construction and demolition (C&D) debris has opened up profitable niches for innovative firms all over North America. Phoenix Recycling of Charlotte, North Carolina — for example — accepts approximately 5,000 tons per month of wood residuals from C&D projects, and processes them into wood chips for use as boiler fuel. More companies are getting involved in the deconstruction phase — companies like Beyond Waste of Santa Rosa, California who have mastered the art of dismantling and marketing salvaged materials.

Public agencies — city and regional waste management departments — play a significant role in diverting wood materials from landfills and incinerators ... saving tax dollars based on their programs. Islip, New York handles about 15,000 tons of woody material each year — producing mulch and compost for local landscapers. The city of Hammond, Indiana has developed a Trees to Furniture project.

Huge amounts of wood debris result from ice storms, tornadoes and hurricanes. How municipalities and private companies build recycling into cleanup programs provides lessons for the future. Case studies describe effective strategies that have been used in such places as Nashville, Tennessee, Council Bluffs, Iowa, Cleveland, Ohio and Puerto Rico.

The big picture of wood recovery is presented by David McKeever of the United States Department of Agriculture's Forest Products Laboratory. Three major sources of wood waste exist in the United States: Municipal solid waste; Construction and demolition debris; and Wood residues from primary timber processing mills. McKeever provides data on the various wood fractions and quantities that are recovered.

In 1998, 11.8 million tons of solid wood waste were generated in the United States as part of MSW; about 600,000 tons were recovered for recycling or composting. Woody yard trimmings — including tree limbs, stumps and brush — amounted to 25.2 million tons with 11.1 million tons recovered by recycling and composting. About 55.2 million tons of wood products were used for construction in 1998, generating nearly 8.7 million tons of waste wood. Nearly 6.6 million tons of this amount were considered to be available for recovery. Demolition waste

was estimated at 26.4 million tons, with about nine million tons considered to be recoverable in 1998. Primary timber processing mills generate an estimated 24.5 million tons of bark and 65.8 million tons of wood residues. Overall, McKeever's data indicate that about 41 percent of recoverable waste wood comes from MSW, 53 percent from C&D waste, and just six percent from primary timber processing mill residues.

Converting residuals into value-added products such as firewood, wood chip boiler fuel, or finding ways to make the decomposing materials provide another function along the way, such as mulch or ground cover, is a growing trend. "From a solid waste perspective, wood waste is the ultimate recyclable," comments John Evans, solid waste director for Knox County, Tennessee. "... It can be moved to a central site in a community. Its end product ... fuel, mulch or compost... is used nearby. It represents conservatively a fourth of the urban waste stream and more if other organic materials are involved in processing. Its cost is generally less than landfilling, especially when you take into account the revenue from the sale of the material. The final payoff is the environmental benefit. .... the end products can reverse pollution and promote plant growth."

The growing interest in green building is also having a positive impact on use of recycled wood in construction. This trend is reported in the section on marketing and end product utilization, which discusses approaches to reach highest volume and dollar markets. Information on safety issues at wood recycling sites and questions and answers about woody residuals round out this special report on *Wood Recycling*. Our objective is to provide you with the ideas, methods, experiences and contacts to improve performance at wood recovery operations.

The Editors
BioCycle

CHAPTER 1

Growing Opportunities

WHAT IT TAKES TO SUCCEED

Experience has shown that it takes more to be successful at wood recycling than simply loading residuals into a tub grinder or horizontal hog. Not only does the material being processed vary substantially, but so do the requirements of the end markets you hope to reach. It takes a keen eye for detail to manage efficiently, safely and profitably. And those details should be specified, clarified and connected in a plan that covers all the steps that move your value-added product through the processing stages and into the hands of end users.

At a *BioCycle* West Coast Conference in March, 2000 on Organics Recycling and Composting, Dave Hardy presented a talk entitled, "There's Money To Be Made." Ten years ago, Dave and Michael Hardy founded a wood recycling company called California Bio-Mass, Inc. based in Bloomington. Their company currently owns and operates two facilities in California, recycling over 100,000 tons of residuals annually. Hardy's first rule on how to succeed as a wood recycler is that "you better have a plan. If you don't have a plan and don't utilize it," he emphasizes, "you are going to be victimized. The industry is too complex with too many new facets and developments. If you don't have a clear vision of where you are going and constantly update that picture, you are not going to make it."

Along with the plan comes the need for permits to process woody residuals. Depending upon where you are located, these are the agencies you'll be dealing with to get site permission — local planning commission, state or regional waste management authority, regional environmental quality agency, and most likely, the fire department. "If your plan and your business do not incorporate making these agencies happy, you are not going to make it," cautions Hardy.

In the case of California Bio-Mass, the company initially got its woody materials almost exclusively by providing rolloffs to places like furniture and pallet manufacturers, sawmills and similar generators. After getting initial contracts, the company focused on building a steady supply of materials. By offering lower disposal options than the $15 to $19/ton average rate, the Hardy brothers were able to steadily build up incoming quantities of feedstock.

Then began the challenge of adding value to processed materials so outgoing product would gain higher prices in the marketplace. When CBM was launched, about 80 percent of its product sales came from the boiler fuel sector. Then that market collapsed, which declares Hardy, "was the best thing that ever happened to us." Today, reflecting his emphasis on the need for multiple revenue streams, agriculture represents 70 percent of sales (up from ten percent three years ago). "In our plan towards agriculture, every step of the way in developing and delivering that product," stresses Hardy, "we are trying to add value in addition to increase revenue in the form of blending, spreading, etc. We feel somewhat impervious to competition because we provide a wide variety of services, with every little increment having a revenue to it." ... We have always operated on the premise that tipping fees and related disposal activities fund the day-to day business, but where we make our money and the ability to grow is in our end use markets like agriculture."

Hardy is constantly looking for ways to cut costs to produce marketable material and add elements that increase prices paid by customers. Three years ago, he was convinced that to make a high-quality compost, he would have to spend $16 to $18 per ton. In spring 2000 at his facilities, the cost was dropped to $9/ton.

Another constant for the Hardy brothers is not to be content with the output quality of the wood processing phase of the business. In the case of compost, for example, "you just can't be making the compost. You have to figure out ways to add value to that basic element. It can be something simple as adding gypsum, but you must elevate that base product into some higher value which

relates to your customers and becoming irreplaceable to them."

Blending And Mixing And Composting

Grimm's Fuel Company in Lake Oswego, Oregon is a family owned and operated business that has been producing landscaping products since the late 1940s, when it began grinding and selling fir bark dust as a sideline to its fuel oil business. The Portland area company makes compost and soil blends on an 11.5-acre site, and uses an adjoining 45-acre area for finished product storage and a soil screening operation. Grimm's also sells some wood residuals as hog fuel, but that low-end market often only covers the cost of transportation. "Without a doubt, the compost makes out better," comments Jeff Grimm, general manager. "If we didn't have the machine time to fill, we'd shut the hog fuel process down."

Tipping fees are $4/cubic yard (cy) for self-haul materials, $3.50/cy for landscapers, $6.50/cy for compacted loads from haulers; $1/cy for chipped material; $6/cy for woody materials that have to be sheared; and $3.50/cy for food residuals. Last year, the company accepted 306,000 cy of yard trimmings, 91,000 cy of wood residuals; 13,500 cy of stumps and woody material; and 1,200 cy of primarily preconsumer vegetative food residuals from grocery stores, produce companies and food processors.

Most of the materials are run through one of three modified hammermills, two of which are primarily in support roles. The main advantages of the stationary grinders, says Grimm, are high tolerance for difficult materials such as metal and low operational costs from running on electricity — fairly cheap in Oregon — as opposed to a diesel-powered portable grinder. But in March, 2000, Grimm's added a portable horizontal grinder for increased processing flexibility. "We've been looking at getting one for quite some time," says Grimm. "We can move it for processing from one end of the property to another. It allows us to do small batches. We also can go out and do some contract grinding."

After being ground, yard trimmings and wood residuals are composted in large piles on two to three acres. In the summer, collected stormwater runoff or well water is added to the piles through a sprinkler system. They are turned three or four times over three to six months. "To most people, it looks like one big pile, but we keep track of how old each section is," says Grimm. After processing, the compost is put through one of the grinders for screening to five-eighths minus.

The proportion of customers from nurseries — who use compost as a component in potting mixes — has been increasing. The breakdown is about 20 percent nurseries, 40 percent landscape contractors and 40 percent homeowners.

Blended soil is mixed from 50 percent sandy loam, 25 percent compost and 25 percent mushroom compost. It is delivered for $100/four cubic yards and sold at the site for $20/cubic yard. "Gardeners use it for topdressing like bark dust, or as a soil amendment in poor quality soil," Grimm says. "They'll also use it if they need more soil for a raised bed or berm."

The Garden Mulch compost also is mixed with equal amounts of mushroom compost. "This is strictly a soil amendment," says Grimm. "It's a lot higher in nitrogen than straight Garden Mulch. Because there's a lot of manure in there, it's a better soil amendment, but it doesn't lend itself well to top dressing." Because of its versatility, Garden Mulch outsells blended soil, with mushroom mulch the least popular of the three.

Grinding Less, Marketing More

W. D. Zwicky and Sons accepts a large array of feedstocks, turning brush, dimensional lumber and tree trimmings (everything from limbs to stumps) into a variety of products. In 1998, the company processed more than 250,000 cubic yards of material into three different grades of mulch, animal bedding and playground cover. While much of the processing is done at locations where the firm does land clearing, it also operates a permanent site at its headquarters in Robesonia, Pennsylvania.

According to Dave Zwicky, who heads the company, incoming material is stockpiled based on its source and what type of product it will be made into. One reason for the separation is the potential for fires. "The dry lumber is a great fuel source. And the green material is a source of heat. Put the two together and you have trouble," says Zwicky. Another reason to maintain separate stockpiles is to ensure quality control. For instance, to produce playground cover, the material must be free of contaminants. The best way to maintain quality is to keep wood separated from start to finish, rather than try to remove contamination in the process stream.

For much of its grinding operation, Zwicky uses two tub grinders in series — the primary unit which does the initial size reduction and a smaller machine for finishing. "The material coming out of the primary unit isn't uniform," says Zwicky. But rather than send everything that has gone through the first unit through the secondary grinder, it is screened first. "Some material is ready to market after the

primary," he explains. By adding the screening step, the amount of material that needs to be processed through the secondary shredder is reduced substantially. Thus screening increases production and reduces wear and tear on the secondary shredder.

Another way Zwicky speeds up production is to preprocess stockpiled material. For large items such as tree stumps and wood timbers, hydraulic shears are used to split the wood into manageable pieces. For material such as pallets and tree trimmings, "we make a conscious effort to run a bulldozer over the piles," adds Zwicky. This simple act breaks up the material prior to going through the grinder.

Not all of the raw wood coming into Zwicky's site goes through the tub grinders. It also uses a horizontal hog. "What goes where, depends on what is most efficient," concludes Zwicky. "The horizontal unit is better for longer, odd size pieces. Tub grinders work better for pallets and bulkier materials, like brush."

At the Davis Street Station for Material Recycling and Transfer, perhaps one of the most important changes that has occurred is minimizing the amount of material that is put through its grinding operation. The Davis Street Station in San Leandro, California is operated by Waste Management of Alameda County. Lowering the grinding volume is especially important, since the site handles about 125,000 tons/year of yard trimmings and wood. "This is an integrated screening and grinding system," says Kevin McCarthy of Waste Management, explaining that processing is a lot more than simply grinding.

Davis Street's approach to processing incoming material is a bit more sophisticated than will be found at many sites around the country. When the system was first started up in September, 1996, incoming material was dumped into a hopper and then fed onto a conveyor where a quality control (QC) inspection took place. "We use anywhere from two to four people to check for contaminants," says McCarthy. "The QC people pull off plastics, metal, and anything oversized."

Waste Management recently added a star screen, which is set to remove anything one-quarter inch or less, prior to the QC station. "Adding the screen dramatically increased the efficiency of the operation," says McCarthy. "It reduced by about 30 to 40 percent what goes through the QC station. Before we installed the screen, the QC station was a real bottleneck."

Another problem the initial screening solved was plugging in the hammermill. Incoming material is stored based on how it's received at the facility. There are three separate tipping areas: urban wood, primarily construction material; self-haul, which typically is mostly brush; and yard trimmings, principally grass and leaves. The yard trimmings caused the plugging. But with most of that material now being screened out at the beginning, that problem has mostly been eliminated.

From the QC station, the material is conveyed through what McCarthy terms the system's "prescreen." That screening operation removes material under two inches. "It really cuts down on abrasives," he notes. Following screening, material is fed into a horizontal hammermill and then through a three-quarter-inch screen. Material that passes over that screen is then subjected to another two-inch screen. Overs from that operation are put back into the system and further processed. Typically, both the fines and the two inch minus material are marketed, the former as agricultural mulch and the later as boiler fuel.

REDIRECTING WOOD AT A LANDFILL

As explained by David McKeever of the United States Forest Product Laboratory (see Section 2), about five percent of all municipal solid waste (MSW) that is brought to landfills consist of wood. The wood fraction includes such items as wooden furniture and cabinets, pallets and containers, scrap lumber and panels as well as wood from manufacturing facilities. In 1998, it was calculated that 11.8 million tons of solid wood waste were generated in the U.S. as part of MSW. In addition, yard trimmings are often brought to landfills (primarily in states which do not have bans on disposal of yard trimmings at landfills or incinerator sites). Many private and municipal landfills have developed programs to divert wood. An excellent example of such diversion is offered by the Texas Disposal Company.

Since 1997, Texas Disposal System, Inc.(TDS) — an independently owned solid waste company located near Austin, Texas — has operated a composting division, Texas Organic Products (TOP). TOP evolved after starting an initial grinding and static pile composting operation at a permitted municipal solid waste landfill site. Today, composting is done on a separate 30 acre site next to the landfill. A wide variety of feedstocks are received; end products include mulch, organic topsoil blends, and compost.

The facility was designed and constructed with the convenience of customers and staff in mind. Regular clients include landscapers, building contractors, trucking firms, trash haulers and the general public. Many of the landscape customers and homeowners who drop off loads of yard trimmings also are large users of our end products, allowing for "one-stop shopping."

The new site was constructed with clay soils excavated from a landfill cell expansion. The initial

phase included six acres of brush grinding, wood chip storage and a six-acre compost pad. The uppermost two feet of clay soils under the compost pad were compacted to meet the Texas Natural Resource Conservation Commission's groundwater protection criteria.

Feedstocks are solicited by TDS staff in the Austin and San Antonio offices. TDS has one designated position focused on special wastes for both the landfill and TOP composting operations. All feedstocks must pass through the TDS landfill gate house for initial inspection. Tipping fees are charged for all incoming materials. The gate attendant makes the decision on whether the load should go to the landfill or the composting facility; only source separated organic feedstocks are accepted for composting. While the tipping fee at the gate is the same for all loads, the internal rate for source separated roll-off loads of compostables hauled to the landfill by TDS is considerably less.

Prior to completion of the new composting facility, only clean, untreated woody materials were accepted, such as brush, yard trimmings, dimensional lumber, etc. Now additional carbon materials are accepted, including shredded office paper from a local federal employer and Austin phone directories. All woody and bulky materials are put through a tub grinder.

Currently, only bulk materials are sold, but bagging is being considered due to high demand for mulch and compost blends from many of the landscaping and retail nursery customers. Freshly ground mulch is sold to customers who typically use it for natural walkways, erosion control, etc. The majority of wood chips, however, are allowed to slowly compost in large static piles prior to further processing. While most of the composted mulch is incorporated into windrows, a smaller portion is reground to two inches or less and sold as a composted mulch.

Soil recovered from land clearing projects is screened to a half-inch particle size and combined with composted mulch in windrows at a 3:2 ratio. The mixture is watered as necessary, composted and then screened to a particle size of three-eighths inch or less. The material has a high clay content, but is very popular for the establishment of new lawns and ornamental beds.

Products are marketed on a three-tiered pricing structure: distributor, wholesale and retail. Distributors typically include soil blenders and organic nurseries that purchase in large volumes. Wholesale customers include landscapers, home builders, bagging companies, trucking companies, etc. The material also is sold in bulk on a retail level, both at the composting facility and at the "Eco-Depot," a TDS-owned and operated solid waste transfer station located west of Austin. Some product deliveries are made on backhauls using TDS roll-off container trucks that would normally leave the facility empty, thereby generating another revenue stream.

Marketing methods include radio and television advertisements, our website, booths at home product and gardening shows, recycling events, and distribution of printed brochures describing the various end products. The TOP division manager takes every opportunity to make presentations to gardening clubs, schools, recycling groups, and other interested organizations to help get the message out. Organized tours are common at the facility, resulting in many new customers. Visitors also enjoy touring the TDS wild game park located in the buffer zones surrounding the landfill and composting operations.

CHAPTER 2

When Grinders Become Marketers

From Tip Fees To Product Sales

When Greg Kaknes took over management of a Woburn, Massachusetts operation that received wood residuals and yard trimmings in 1987, the approach had been simply to take in tipping fees and reduce material volume through grinding. The parent company had been founded in California, and the owner expanded in the Northeast after noting that tipping fees were highest in the region. "At that point, nobody knew what they were doing," recalls Kaknes. "We were really a stepsister of the waste business — a way to save money by avoiding the cost of landfilling." Kaknes switched the revenue strategy from relying on tipping fees to producing and selling high-quality product to landscapers. "I got sick of seeing them leave here with empty trucks," he explains.

At the beginning, he sent wood residuals to power plants in northern New England and had bark back hauled to his site. In 1993, Kaknes bought the business from the parent company and changed the name to Kaknes Wood Products and Landscape Supply. One of his first moves was to cut out the contaminated wood supply being received by the site, which had comprised about 30 percent of the business. He has since built up a mulch and composting business that serves the Boston area with six locations. Sales are on pace this year to total 100,000 cy of mulch and 15,000 cy of soil and compost products.

Tipping fees are $3/cy for clean tree chips; $6/cy for pallets and mixed yard trimmings and leaves; $9/cy for brush and tree limbs; and $16/cy for large stumps. Yard trimmings and leaves are put through a grinder and composted for six months in windrows about eight to ten feet high and 15 to 18 feet wide. A front-end loader is used to turn the piles just a few times during the process. "We're not real concerned with speed because it's a very seasonal business," says Kaknes. "The material won't be sold until the next year anyway." The compost is put through an Erin star screen for half-inch minus particles and the fines are recomposted. "Unlike almost everybody else in the industry, we regrind our fines," he adds. "It's a pretty expensive way to mix and blend, but it generates a good product." The other soil amendment and planting products include topsoil screened to quarter-inch minus, a blend of compost and topsoil called Superloam, and a finely screened version of Superloam.

Wood for mulch is ground and piled up 16 to 17 feet high, about 50 to 60 feet wide and 200 to 300 feet long. Enough rain usually falls to provide moisture without watering the piles. After aging, the mulch is ground again. Kaknes produces several different mulches at 1.75-inch minus. The one exception is Enviromulch, a one-inch minus jet black mixture of hardwoods and softwoods, with pine the predominant type. Forest Supreme is a combination of aged pine bark and Enviromulch. "It's dark, but has a pine aroma to it, whereas Enviromulch has a compost-like smell," says Kaknes. Another mulch combines aged hemlock with pine and other barks. "We use smaller screens, which increases our costs and slows productivity, but it meets our niche," he says. "Landscapers like a consistently finely ground product." The company also purchases bark from the timber industry and grinds it for resale.

Kaknes was impressed when he observed an early coloring system demonstrated about ten years ago, but held off on entering the colored mulch market until the product matured. "It went through some serious growing pains in New England with many inferior quality colored mulches," he says. "About five years ago, some major bark producers in Maine started coloring bark, which we emulated a year or so later." Pine bark and wood chips are mixed together, ground and dyed. Because the color mirrors aged hemlock, a little aging of the stockpile before the dyeing process is not a big concern.

Another marketing avenue is providing mulch application service, most of which is subcontracted to Kaknes by landscapers. "One of the nice things about our situation is that being the manufacturer of finished product, we meet the specifications for

our Rexius and Finn blower trucks," says Kaknes. "We also sell quite a bit of mulch to other people with blower trucks because they know all of our material can go through our own. The only reason we're in the blower business is to sell more mulch."

Blowers are difficult to run for unskilled operators, says Kaknes. The mulch has to be finely ground and relatively low in moisture, or it will clog the machine. "You really want to stay with larger applications," he adds. "If you get into small tree rings and condominium complexes where each townhouse has a one-yard bed, it's faster to do it by hand. The bigger the mulch bed, the more appropriate the automation."

Kaknes generally has a six-cy minimum for residential jobs. In the middle of May, he runs a program for communities that do not use landscapers. "Some houses may only have five to six yards, but we'll go out with a whole load and use it up in the neighborhood," he says. Application charges are site specific and determined in part by a saleman's visit, but they generally decrease per cubic yard as volume increases. "We try to get, on average, $20/cubic yard just on installation, which is in addition to the cost of the mulch," says Kaknes.

The most recent marketing move was to open five additional sites this spring. One of them is similar to the Woburn headquarters in that it receives, processes and markets material. The others are satellite locations that receive feedstock back hauled to the processing sites in exchange for finished product. The five new locations bear the name "Landscape Express" to reflect the full-service convenience they offer. "These enable us to reach a whole new market of landscapers and residential clients," says Kaknes.

Processing Sawmill Scraps To Meet Demand

Lashway Logging began in 1965 as a logging company, then grew into a sawmill. In the mid-1980s, the company purchased a tub grinder to process its own wood by-products into mulch. As demand grew, it upgraded equipment and started bringing in end trimmings and slab trimmings from other area sawmills.

Now the company purchases some bark mulch locally for resale and operates grinders to produce seven different mulches — some singular, some blended and some coupled with colored chips. The company sends out five tractor trailers daily to serve wholesalers during busy periods, and several smaller trucks for local markets.

Bark for Forest Mix mulch is purchased from several different sources, then combined, ground and screened to 2.5 or three inches. It is aged for about a week in a pile no larger than 1,000 cy. A darker version is aged for two to three months, or even longer during winter. "If it's during the season, we'll roll the pile periodically with front-end loaders," says Lashway. "Otherwise, it's not aerated, so it doesn't darken as quickly. In past years that were very dry, we had smaller piles and had to add water. Now the larger piles seem to retain moisture better, and we don't have to add water."

Lashway also produces higher-end hemlock mulches sized at 1.25 to 1.5 inches. One is natural and another is ground with dyed wood chips for brighter and longer-lasting color. To prevent darkening of the chips, piles are no higher than eight to ten feet, processing closely matches demand to prevent aging, and hardwood is kept out. "Hardwood seems to be the chip that is more acidic and able to support aerobic activity right off the bat," Lashway explains. "We make sure suppliers don't get the woods mixed up."

The company got into colored mulch four years ago when the prices paid by paper companies for slab wood chips dropped, says Lashway. Red, brick red and chocolate mulches are produced in a Becker Underwood coloring system. "As colored mulches have become more popular, we entered the market to protect our customer base," says Lashway. "The more we can provide for our customers, the more stick they'll with us. We hesitated for a year or two, but felt we had to take the plunge."

Although the company is experimenting with composting, when it comes to mulch, Lashway has no plans to venture beyond sawmill residuals. "One issue when we started was whether we would deal with lower-grade material," he says. "If you're not careful with pallets, you'll find things like shrink-wrap strands and aluminum nails that won't come out with a magnet. And sometimes plywood can be an issue, because if it's not sized right, it sticks out like a sore thumb."

Targeting The Landscape And Garden Industry

County Conservation in Sewell, New Jersey started out as a composting company in 1992, taking in yard trimmings from 35 municipalities in Camden and Gloucester Counties. The company realized that to maximize sales opportunities, it had to generate more products for the steady stream of landscapers who came through its gates to drop off compostable material. At first, the business concentrated on composting and purchased mulch from land clearing operations for resale. In a few years, it started accepting wood chips for its own mulch production, and a few years after that,

County Conservation jumped into the colored mulch market. The philosophy is to serve as a one-stop shopping location for landscapers and other customers by offering the full range of organic products (as well as items like sand, road salt, stone and pavers) for maximum convenience. About 60 percent of business is from landscapers, 30 percent from the garden industry and the rest from individuals.

The company receives about 100,000 cubic yards of organic material annually. The average tipping fee for yard trimmings is $8/cy. Leaves are dropped off for $5/cy because they do not have to be processed before composting. Clean wood that can be ground once for colored mulch is tipped at no charge.

Fourteen acres of the 21-acre site are dedicated to composting. Yard trimmings, grass, leaves and brush are put through a grinder that is pulled along for three or four passes to start a windrow. A bucket loader completes pile formation. The windrows are turned with a Wildcat about two or three times in the first several weeks, depending on precipitation and wind conditions, then about once/month. "We get enough grass clippings to create moisture, so we don't have to add water," says John Petrongolo, managing partner. To control odors during the heavy grass season, five to ten gallons of an anti-odor product are added to a 2,500-gallon batch of water and sprayed onto the piles after turnings.

After five months or so, the compost is placed in piles about 15 feet high around the perimeter of the facility for curing. Usually, it takes about a year from the time material comes through the front gate until the finished compost has been put through a screen set at three-eighths inch. About 12,000 cy/year of compost are sold and roughly 10,000 cy/year are mixed at a 1:2 ratio with sandy New Jersey soil, then rescreened in a trommel, for soil blends.

Feedstock contamination is the main difficulty in composting. The main culprits are haulers that use trash trucks to pick up yard trimmings at curbside. "We have two or three guys on-site behind the screening plant pulling plastic out of the overs," says Petrongolo. "We've tried a lot of different processes to get out the plastic, but the best way is by hand. If I can clean up the overs close to 100 percent, I can get some decent money from them." The overs are piled up for a year, rescreened and sold as low-grade mulch for $8/cy. Compost prices range from $8 to $12/cy, and soil blends cost $12 to $15/cy.

The remaining County Conservation property is used for mulch production. Wood chips from pallet companies, transfer stations and custom grinders come in at six inches to one foot long. "I like to avoid taking whole pallets to reduce time and cost, but in the long run, I probably won't be able to," says Petrongolo. "Right now the challenge is getting enough sources of wood for the coloring end of the market. It seems to have really taken off. If we had another 20,000 to 30,000 yards of wood chips, I know that we could sell them."

The chips are reduced in a tub grinder to about one inch. They are piled up no more than 15 feet high in concrete bins with 2,000 to 6,000 cy in each. "As high as the buckets from the loaders will reach is as high as we go," says Petrongolo. "The tighter you pack them in, the greater potential for a fire. Smoldering fires going through veins in the pile are hard to get out. They create a bad smell to the wood and the possibility of the whole pile going up in flames."

Wood for red mulch is loaded into the hopper of a mulch coloring system, while chips for black and brown dyed mulch are aged about three to four months. This year, County Conservation upgraded from a 10-cy batch coloring machine to a Fecon continuous feed system. The machine increased capacity from 400 cy/day to 1,800 cy/day. "I like the mulch to sit two to three days for curing," adds Petrongolo. "If I sell it too quickly, a heavy rain will wash the dye off."

Colored mulch sells for $14 to $20/cy. Traditionally, red mulch has dominated with about 80 percent of colored mulch sales, but the trend this year is toward 50 percent red mulch, 25 percent brown and 25 percent black. The dyed mulches are becoming more popular among landscapers because their consistent color lasts just about a whole season, says Petrongolo, whereas natural hardwoods tend to dry out and turn a cinnamon color, and hardwood root chips take on a charcoal or gray hue.

A few times each year, the business performs contracted grinding. Roots are reground, moistened and sold as root mulch for $13 to $17/cy. Hardwood chips dropped off by tree surgeons and tree trimmers also are reground and moistened, selling for $12.50 to $16.50/cy. County Conservation produces about half of the 70,000 to 80,000 cy of mulch it sells annually and buys the rest, including a licorice root imitation popular in the Delaware Valley.

Three to seven trucks are leased each day to deliver mulch, ranging from a 10-cy vehicle to a 100-cy walking floor trailer. Rates are based on about $60/hour roundtrip. "I try to build in an extra five percent for administrative costs, but I'm happy if I can just cover the cost of trucking," says Petrongolo.

Wood Recycling

How To Process Materials For Profitable Markets

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